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Chapter 04

REFRACTION OF LIGHT AT CURVED SURFACES

ABSOLUTE REFRACTIVE INDEX OF A MEDIUM:

1. According to Newton, the absolute refractive index of medium is the ratio of speed of light in vaccum to that in medium.

$$\mu = \frac{\text{Speed of light in vaccum(c)}}{\text{Speed of light in medium(v)}}$$

$$\therefore \text{Vacuum } \mu \text{ medium} = \frac{c}{v} = \frac{\lambda \text{ vaccum}}{\lambda \text{ medium}}$$

2. Absolute refractive index of medium varies with

a) Wavelength of light or colour of light

$(\mu_{violet} > \mu_{red} \text{ as } \lambda_{violet} < \lambda_{red})$

b) Temperature of medium. In general, with increase of temperature, refractive index of the medium decreases.

c) A medium in which the speed of light is more is known as optically denser medium.

d) When a ray of light travels from medium(1) to medium (2), then the refractive index of medium(2) with respect to medium(1) is i.e., $\mu_2 = \frac{\mu_2}{\mu_1} = \frac{v_1}{v_2} = \frac{\lambda_1}{\lambda_2}$

Where v_1 and v_2 are the speeds of lights in medium (1) and medium (2) respectively.

3. According to this principle if a light ray is reversed, it always refraces its path. i.e., the refractive index of the second medium with respect to the first medium is equal to reciprocal of the refractive index of first medium with respect to second medium. ∴

$$\mu_2 = \frac{1}{2\mu_1} = \frac{\mu_2}{\mu_1}.$$

4. If a ray of light travels a distance 'X' in time 't' in medium of refractive index μ, then $\mu = \frac{Ct}{x}$.

5. If x_1 and x_2 are the distances traveled by light in two media of absolute refractive. Indicies μ_1 and μ_2 respectively in a given time, then $\mu_1 x_1 = \mu_2 x_2$.

6. If a ray of light takes t_1 and t_2 times in two media of absolute refractive indicies μ_1 and μ_2 respectively to travel the same distance, then $\mu_1 t_2 = \mu_2 t_1$.